numerous bones and fragments of bone, of which some were gnawed, and a few appear to have been burnt. Coprolites were very abundant, 69 distinct "finds" having been met with during the twelvemonth. They sometimes, though rarely, consisted of a solitary ball, whilst at others upwards of 20 were lying together and not unfrequently cemented into large lumps. Occasionally the amount of matter of this kind found in a single day was sufficient to fill a large basket.

Fifteen specimens of flint and chert were also met with in the cave earth, 6 of them occurring in the Cave of Inscriptions, 5 in Underhay's Gallery, 2 in the Long Arcade, and 2 in Clinnick's Gallery. The finest of the series is No. 6324, found December 30, 1873, in the second foot-level, beneath the floor of granular stalagmite from 2 to 2·5 feet thick. It is a very symmetrical tongue-shaped tool, fashioned with much labour out of a chert nodule, and worked to an edge all round the perimeter except at the butt end, where portions of the original surface remain on both faces. It is 3·8 inches long, 2·3 inches in greatest breadth, 1·5 in greatest thickness, and convex on both faces, from each of which several flakes have been struck. Though fashioned out of a nodule, which is very rarely the case amongst the cave-earth implements, its symmetrical form and comparatively high finish are highly characteristic of the era to which it belongs.

No object of interest of any kind has been found in the Crystalline Stalagmitic Floor during the year; but the Breccia lying beneath it has been by no means unproductive. In this oldest of the cavern deposits the remains have been, as heretofore, exclusively those of bear, so far at least as is at present known, and in addition to a large number of bones, including a considerable portion of a skull, 441 teeth have been met with in it, of which 149 were in the Long Arcade, 115 in Underhay's Gallery, 91 in the Cave of Inscriptions, and 86 in Clinnick's Gallery.

Twentys-six pecimens of flint and chert have also been found in this deposit, of which 10 occurred in the Long Arcade, 6 in Clinnick's Gallery, 5 in Underhay's Gallery, and 5 in the Cave of Inscriptions.

The finest of the series (No. $\frac{1}{64}$III) and indeed one of the finest the cavern has yielded from the commencement, was found April 23, 1874, in the fourth or lowest foot-level, with 1 tooth of bear, fragments of bone, and a small chert flake (No. $\frac{2}{64}$II) which had probably been rolled. It measures 4·5 inches in length, 3 inches in greatest breadth, 1·1 inch in greatest thickness, is very convex on one face, slightly so on the other, retains a portion of the original surface near the butt end, and is rudely quadrilateral in form, with the angles rounded off. Several flakes have been struck off each face, and the edge to which it has been reduced along its entire margin, except at the butt end, is by no means sharp; its surface is almost completely covered with an almost black, probably manganesic smut, whilst a slight chip near the pointed end shows it to consist of a very light-coloured granular chert. Several lines betokening planes, probably of structural weakness or perhaps of fracture, entirely surround it. If it has really been fractured, it must have occurred where the tool was found, and the parts have been naturally reunited without being faulted. Its character as well as its position shows that this fine implement belonged to the era of the Breccia.

This specimen is of considerable interest, both on account of the lines which cross its surface and of the position it occupied.

Amongst the flint implements found in Brixham Cavern that known as No. 6—8 has attracted considerable attention, and has been described and figured by Mr. John Evans, both in his "Ancient Stone Implements" and in the "Report on the Exploration of Brixham Cave." It was found in two pieces, the first on the 12th of August, 1858, the second, 40 feet from it, on the 9th of the following September; and it was not until some time after the latter date that the late Dr. Falconer discovered that the two fragments fitted each other, and when united formed a massive spear-shaped implement. The lines on the Kent's Cavern specimen just described show that it had either been fractured where it was found, or, what seems more probable, that it is traversed by planes of structural weakness, such that a slight blow would break it into two or more pieces, which a stream of water would easily remove and probably separate, and thus produce a repetition of the Brixham case.

The Kent's Cavern tool was found in a small recess in the wall, just within the outer or wider entrance of Clinnick's Gallery, within a very few feet of the Inscribed Boss of Stalagmite, and, as has already been stated, in the fourth foot-level of the Breccia; that is, at the greatest depth in the oldest of the cavern deposits to which the present exploration has been carried, and is thus wonderfully calculated to take the mind step by step back into antiquity.

First, very near the spot occupied by the specimen, there rises a vast cone of stalagmite, which an inscription on its surface shows has undergone no appreciable augmentation of volume during the last two-and-a-half centuries.

Second, prior to that was the period spent in raising the greater portion of this cone, which measures upwards of 40 feet in basal girth, reaches a height of fully 13 feet, and contains more than 600 cubic feet of stalagmitic matter.

Third, still earlier was the era during which the cave earth was introduced, in a series of successive small instalments with protracted periods of intermittence, when the cavern was alternately the home of man and of the cave hyæna, and the latter dragged thither piecemeal so many portions of extinct mammals as to convert the cave into a crowded palæontological museum.

Fourth, further back still, was the period during which the base or nucleus of the cone or boss was laid down in the form of crystalline stalagmite.

Fifth, and earliest of all, was the time when materials not derivable from the immediate district were carried into the cavern, through openings now probably choked up, entirely unknown, and the direction in which they lie but roughly guessed at, when apparently the cavern-haunting hyæna had not yet arrived in Britain. At an early stage in this earliest era man occupied Devonshire; for prior to the introduction of the uppermost four feet of breccia, one of his massive unpolished tools, rudely chipped out of a nodule of chert, found its way into a recess in the cavern, and having a character such as to show that it must have lain undisturbed in the same spot until it was detected by a committee of the British Association.

SCIENTIFIC SERIALS

THE *Journal of the Chemical Society* for September contains the following papers communicated to the Society:—On the products of the decomposition of castor oil, No. 3. On the decomposition by excess of alkaline hydrate, by E. Neison. The action of sodium hydrate mixed with water gives rise to the formation of a mixture of an alcohol and a ketone on distillation. The alcohol is an octylic alcohol, which the author regards as the secondary alcohol methyl-hexyl carbinol $H\begin{cases} C_6H_{13} \\ CH_3 \\ H \\ OH \end{cases}$ The ketone is methyl-hexyl ketone. The olefine derived from the alcohol has been examined. The supposed heptylic alcohols of Städeler and Petersen turn out to be a mixture of octylic alcohol with methyl-hexyl ketone.—On the action of nitrosyl-chloride on organic bodies, Part I. On phenol, by Dr. W. A. Tilden. The phenol is oxidised to quinone, which substance is then converted into chloramil, the nitrosyl-chloride being completely reduced—a certain amount to ammonium chloride.—Aniline and its homologues, &c., in coal-tar oils, by Watson Smith.—On the action of chlorine, bromine, &c., upon isodinaphthyl, by Watson Smith and James M. Poynting. The action of chlorine gives rise to the formation of a tetrachlorinated derivative, $C_{20}H_{10}Cl_4$. Bromine replaces seven atoms of hydrogen, giving rise to the compound $C_{20}H_7Br_7$. With concentrated sulphuric acid a conjugate acid is formed, of which the barium and sodium salts have been examined. Both the chlorinated and brominated derivatives are amorphous powders.—On hydrogen persulphide, by William Ramsay. The persulphide was prepared by first saturating alcohol with ammonia gas, and then passing sulphuretted hydrogen through the solution. The ammonium sulphide thus produced was shaken up with sulphur and a solution of strychnine in alcohol added. White crystals having the formula $C_{21}H_{22}N_2O_2H_2S_3$ separate out on standing. These crystals treated with sulphuric acid yield hydrogen persulphide in the form of oily globules, but the yield is small, and the separation from the sulphuric acid extremely difficult. The author finally adopts the old method of pouring calcium persulphide into hydrochloric acid. Analyses of the compound thus obtained gave results indicating a formula between H_2S_7 and H_2S_{10}. The properties of the persulphide have been examined in some detail.—The journal contains its usual valuable collection of abstracts.

Geological Magazine, Oct. 1874.—The original articles contained in this number are (1) a continuation of Mr. Lechmere Gupp's article on West Indian Tertiary Fossils; (2) Notes on

the impression of *Palæontina oolitica* in the Jermyn Street Museum, by A. G. Butler, including a discussion on its zoological place; (3) The structure of Lambay Porphyry, by Prof. Hull, a paper read before the Geological Society of Ireland; (4) Geology of West Galway and South-west Mayo, by S. H. Kinahan, an epitome of a communication made to the British Association; (5) Note on the Phonolite of the Wolf-rock, by S. Allport.

Zeitschrift der Œsterreichischen Gesellschaft für Meteorologie, Sept. 15.—This number contains a description of the self-acting printing barometer, invented some years ago by Mr. Hough, director of the Observatory at Albany, U.S., but not very well known in Europe. By the employment of electricity, the barometer will record movements as slight as ·0005 in., and will print not only curves, but a register as well, at any required intervals per hour. The apparatus does not require frequent attention.—Among the *Kleinere Mittheilungen*, we have a notice of M. Goulier's aneroid, provided with a scale of heights beside the scale of millimetres. It is contended against this arrangement that two scales make a correct reading less easy, that the precision of the scale of heights, where the intervals between the lines are not equal, must be doubtful, and that the correction proper to each aneroid would not be easily applied to the scale of heights.—M. Mühry has an article On differences of temperature as a cause of latitudinal oceanic circulation. He maintains that two causes are at work, each of which tends to produce latitudinal circulation, namely, the diminution of the force of gravity towards the equator, and the increase of temperature with consequent expansion and diminished specific gravity. The lower strata of cold water rise at the equator towards the surface, and a corresponding descent of warm upper strata must take place in polar regions. With regard to the debated question on the point of greatest density of sea-water, he holds it to be the same as that of fresh water, and late experiments bear out his argument on this subject.

Bulletins de la Société d'Anthropologie de Paris, fascicule vi. tome 8, 1874.—In the closing number of the Society's last year's Reports, the remains found at Solutré, near Macon (in August 1873), formed a large proportion of the subjects of the papers. The assumed find at Solutré of a metallic ring, enamelled green, on one of the phalanges of the skeleton which had been uncovered in the presence of MM. de Quatrefages, Broca, and nearly fifty other persons, has been rejected by the Society as unworthy the consideration of scientific men; while M. Broca, in a detailed report of the investigation in which he on that occasion took the principal share, has clearly shown the impossibility of such a ring escaping his notice had it been present. M. Broca in another paper considers at length the characteristics of the various crania which have been found at Solutré since the spot was first examined by MM. de Ferry, Arelin, de Freminville, Lortet, and others, and described by the two first-named in their work "Le Mâconnais Préhistorique" (1870): and he draws attention to the various prehistoric and historic epochs at which interments have been made at Solutré, and by which the question of the true age of these remains has been surrounded with greater difficulties than belong to the palæontological character of any other similar spot in France. The prehistoric crania at Solutré are in a very bad condition; but they present a large capacity of nearly 1,600 cubic centimetres, with an index of only 82·87. Platycnemic tibiæ, with the characteristic columnar femures, were found, but M. Broca seems on the whole to assume that the earliest discovered men of Solutré belonged to a mixed race similar to those of the Belgian caves of La Lesse. M. Hamy has demonstrated that brachicephalic crania supervene at Solutré on the dolichocephalic, as at Cro-Magnon.—M. Topinard read a paper on the systems of craniometry, in which he endeavoured to show by the contradictory cranial determinations arrived at in reference to the Solutré and other recent finds, how important it is to show a definite method of cranial measurement. In the discussion which followed, M. Rochet opposed the notion that craniometry in art is based upon individual fancy more than scientific accuracy; while M. Broca admitted the defects of the present methods.—A note by M. P. Bert, on the twin monster known as the double-headed nightingale, led to a general discussion on double or twin monsters, and to the inquiry whether they were produced from two distinct embryos or from one germ endowed *ab initio* with the property of doubling or reproducing certain parts. It was generally admitted that external circumstances have no power to induce embryonic duality.—Madame C. Royer, in a very original paper on the origin of different human races, protested against the hypothesis which derives all European races from Asia, and endeavoured to show by the geological history of the earth that man must have appeared first on the great Austral continent, and radiated thence to the other continents. Her novel views were received with marked attention, and it was felt that if she should be able to adduce sound geological proof of her statements, her hypothesis of primary human migrations will be as important as it is original. Till she fulfils her promise of clearly expounding her theory, her arguments cannot, however, be accepted as more than ingenious speculations.

Revue d'Anthropologie, tome iii. No. 3.—M. Paul Broca supplies us in this number of the review, of which he is sole editor, with a comprehensive history of the course of observations which have led to the enunciation of the theory propounded by him (in the *Bulletins de la Soc. d'Anthrop. de Paris* for January and February 1874) in regard to the hygrometric properties of fossil crania. After considering the important but inadequately appreciated experiments made in 1859 by M. Welcker in reference to this point, he enters at great length into the consideration of the numerous carefully conducted series of observations and measurements by which he was led to the conclusions which he has adopted, and his paper constitutes, therefore, a most valuable *résumé* of the physical as well as the palæontological bearings of the subject.—M. Bérenger-Feraud, surgeon in the French navy, gives, as the result of personal investigation, an account of the different tribes who occupy the shores of the Casamanca in Intertropical Africa. This stream, on which the Portuguese and French have a few scattered trading stations, is one of the numerous rivers of Western Africa which take their source on the western slope of the Fonta-Djalon mountain-ranges. The author considers the Casamanca peoples under the three heads of primary or autochthonic, invading, and immigrating races; the first including the Feloups and Bagnouns, the second the Belantes, Mandingues, and Peuls, and the last the Onolofs, Saracolais, Machouins, Taumas, &c.; and passing each in review, he describes their habits, the form of fetichism followed by each, and their general social condition. Among the Balantes he notes the singular custom of making the duration of marriage responsibilities dependent on the conservation of the "pagua" or festive garment given to the wife by the husband on the occasion of their wedding. The woman who wishes to secure a divorce has merely to wear out her pagua as fast as she can, and then present it in a tattered condition to her family, on which she obtains her release from the power of her husband. Among the same people a charge of sorcery, which is very common with them, can only be met by a public appeal to the ordeal of the "mançone" or "ago broumedion," which is said to be a decoction from the bark of a poisonous tree, and which it would appear is always fatal unless rich gifts have secured the copious watering of the draught by those to whom its preparation is confided.—MM. Daleau and Gassies give a report of the appearances presented by a cavern at Jolias, in the canton of Bourg (Gironde), which, on its recent exploration, yielded in a stratum of red diluvium below a solid calcareous bed, a rich deposit of bones, many of which had been cleft, but none of which belonged to extinct species, numerous flint implements similar to those found at Moustier and Solutré, but no remains of pottery, except in the upper part of the cavern, where they had probably been thrown aside long after the disuse of the cavern.

Zeitschrift für Ethnologie, heft vi. 1873.—The first article in this number gives some interesting details in regard to the almost unknown Red Indian tribe of the Tulus of Panama, believed to be the descendants of the Churchures, who successfully resisted the attempts made by the Spanish Conquistadores for their subjection. Representatives of these people appeared last year at Bogota with the object of making complaints against the collectors of caoutchouc, cacao, and elephant nuts, who had come to their woods and been guilty of violence against the tribe, and it was from his examination of these men that the author drew up his report.—In a suggestive article by Prof. Bastian on the nature of ethnology and its relations to geography, the author points out how essential the knowledge of physical laws is to the right comprehension of ethnology, which is in itself less a zoological history of man than a history of the geographical distribution of man considered in relation to physical habits, which, like the physical characteristics of different faunas and floras, depend primarily upon geographical position, and secondarily on climatic, geognostic, and other analogous conditions.—Herr Virchow laid before the society several skulls of the Goldi, a hitherto almost unknown tribe, who occupy the shores of the Amoor at the point where

the Sangari and the Ussuri join the main stream. He is of opinion that these people are more nearly allied to the Tunguses than to the Esquimaux, the crania in his possession being remarkable for their high brachicephalic form and large cranial capacity.—In a letter from Dr. Bleek, addressed to the society, the writer draws attention to the peculiarity evinced by the Bushmen of becoming fairer and lighter in skin after they have for a time enjoyed good and abundant food, with the comforts of civilised life. This special characteristic he regards as a proof of the difference between these peoples and the negro races of South Africa, and as an evidence of their nearer affinity with more northern tribes. Dr. Bleek at the same time expresses his opinion that the dances by moonlight, which are systematically practised by the South African tribes, are connected with some form of moon-worship; while Dr. Fritsch, on the other hand, believes that these dances are in no way religious, and are simply called forth by the charm of tropical moonlit nights.—Herr Virchow exhibited some stone implements or wedges precisely similar to the so-called flint knives, which we are accustomed to assign to the Stone Age; yet these were of modern fabrication, being made in the present day in Syria, where they are used, amongst other purposes, to keep the different parts of the Syrian threshing machine (*tribulum*) in their places.

Astronomische Nachrichten, No. 2,007, contains the observations of position and magnitude of 148 comparison stars and 13 minor planets, made with the meridian circle at Berlin.—No. 2,008 contains the positions of 108 more stars, reduced to the mean equinox of 1870, and the positions of 20 planets, made by the same instrument. With the Berlin refractor the positions of some 58 planets have been determined, and some of them have been observed on a number of nights.—In No. 2,009 L. Schulhof gives an ephemeris and the following elements of Comet III. 1874, discovered by Coggia on the 19th of August:—

$$\begin{aligned} T &= \text{July } 5{\cdot}16629 \text{ Berlin time.} \\ \pi &= 347^\circ\ 20'\ 2'' \\ \Omega &= 213^\circ\ 12'\ 15'' \\ i &= 28^\circ\ 25'\ 41'' \\ \log. q &= 0{\cdot}15831 \end{aligned}$$

M. Geelmuyden gives elements of Coggia's first comet of 1874, and assigns a period of 10,445 years.—D'Arrest contributes a number of spectroscopic observations of Secchi's types III. and IV.—Ormond Stone gives a note on certain expressions of the distance of a comet from the earth, and a paper on Brünnow's method of correcting the orbit of a comet.—Dr. Holetschek gives an ephemeris of Borrelly's comet, the two last positions of which are—

	R.A.	DEC.
Oct. 29 ...	6h. 21m. 9s.	+ 50° 37′·6
Nov. 2 ...	6h. 5m. 11s.	+ 47° 36′·7

and an ephemeris of Coggia's comet of the 19th of August—

Oct. 29 ...	5h. 0m. 41·8s.	− 0° 12′ 55″
Nov. 2 ...	4h. 48m. 46·4s.	− 1° 49′ 50″

Memoria della Società degli Spettroscopisti Italiani, August.—Father Secchi contributes a paper discussing the theory of solar spots set forth by Galileo, and he compares the theories and observations of Wilson, Kirchhoff, Faye, and Gautier. Tacchini adds a note discussing M. Faye's theory of the formation of solar spots, and opposing it on the ground that spots and faculæ seem to accompany eruptions. Tacchini also gives notes on the positions of the chromosphere where magnesium vapour was observed in January last, and he also mentions the position of prominences accompanying spots at the limb, and containing metallic vapours. The magnesium line and 1474 occur most frequently.—Notes and measurements of the comet (Coggia) made by E. Dembwoski with a 7-inch Merz, together with drawings of the nucleus, appear in this number.—Schiaparelli contributes a note on the new star observed in Sagittarius in 1690. He thinks it the same as the variable star S Sagittarius, R.A. 287° 40′, Dec. 19° 18′.—Tacchini gives a table with notes showing the number of meteors, with their brightness, observed in each fifteen minutes from 10h. 30m. to 13h. 15m. on the 9th, 10th, and 11th of August last. The radiant point

		R.A.	DEC.
On the 9th,	of 35, was	2h. 52m. ...	54° 56′
„ „	of 3, „	2h. 14m. ...	55° 43′
„ 10th,	of 71, „	2h. 53m. ...	54° 40′
„ „	of 11, „	2h. 14m. ...	56° 14′
„ 11th,	of 14, „	2h. 53m. ...	54° 43′
„ „	of 10, „	2h. 14m. ...	56° 20′

SOCIETIES AND ACADEMIES

MANCHESTER

Literary and Philosophical Society, Oct. 6.—Rev. William Gaskell, M.A., vice-president, in the chair.—On the ossiferous deposit at Windy Knoll, near Castleton, by Mr. Rooke Pennington, LL.B.—On some teeth from a fissure in Waterhouses Quarry, in Staffordshire. Mr. Pennington called attention to some teeth of a bison (*Bos priscus*) from a fissure in a quarry at Waterhouses. The animal had evidently fallen in while coming to drink at the river Hamps. It had been erroneously described as an Irish elk.—On the extent and action of the heating surface for steam boilers, by Prof. Osborne Reynolds, M.A.—Dr. Joule made a further communication respecting his mercurial air pump described in the Proceedings for Dec. 24, 1872, and Feb. 4, Feb. 18, and Dec. 30, 1873. He had successfully made use of the glass plug proposed in the Proceedings for Feb. 4, 1873. This he constructs by blowing out the entrance tube and grinding the bulb thus formed into the neck of the thistle-shaped glass vessel. To collect the pumped gases he now employs an inverted glass vessel attached to the entrance tube and dipping into the mercury in the upper part of the thistle glass.

WINCHESTER

The Winchester and Hampshire Scientific and Literary Society held the first meeting of its sixth session on Oct. 19; Dr. Heale, treasurer, in the chair.—The Rev. F. Howlett, F.R.A.S., delivered an introductory address, noticing many of the more important discoveries made during the past year in various departments of scientific research.

BOOKS AND PAMPHLETS RECEIVED

BRITISH.—Report of the Weather Telegraphy (E. Stanford).—Annual Report Aëronautical Society of Great Britain (Hamilton and Co.).—Journal of the Iron and Steel Institute, 1874 (Spon).—Note on the Perception of Musical Sounds: J. G. McKendrick, M.D. (Neill and Co.).—Flora Cravoniensis: John Windsor, F.R.C.S., F.L.S., &c. (Cave and Co.).—The Contrast between Crystallisation and Life: John E. Howard, F.R.S., F.L.S., &c. (Hardwicke).—Atomism: Dr. Tyndall's Theory Examined and Refuted: Rev. Prof. Watts, D.D. (Mullan, Belfast).—Brixham Cavern: N. Whitely, C.E. (Hardwicke).—Philosophy, Science, and Revelation: Rev. C. B. Gibson, M.R.I.A., &c. (Longmans).

AMERICAN.—Nomenclature of Diseases: J. M. Woodworth, M.D. (Washington).—Proceedings of the American Association for the Advancement of Science.—Notes on Ophidiidæ, &c.: F. W. Putnam.

FOREIGN.—L'Astronomie Pratique: C André and G. Rayet (Gauthier-Villars, Paris).—Einige Bemerkungen über den Werth, welcher im Allgemeinen den Angaben in Betreff der Herkunft menschlicher Schädel aus dem ostindischen Archipel beizumessen ist: Dr. Meyer (Wien).—Über neue und ungenügend Vögel von New Guinea und den Inseln der Gelvincks Bai: Dr. Meyer.—Manuel de la Cosmographie der Moyen Age: A. F. Mehren (Copenhagen).—Neues Handwörterbuch der Chemie: Dr. H. von Fehling (Viewig and Son).—Die Geologie: Franz Ritter von Hauer (A. Holder, Wien).—Normale Zeiten für den Zug der Vögel: K. Fritsch (Wien).—Fosselen Bryozoen: Prof. Dr. A. E. Roon Reuss (Wien).—I precursori di Copernico nell' antichita: G. V. Schiaparelli (W. Hoepli).—Osservazioni Astronomische e Fisiche: G. V. Schiaparelli (W. Hoepli).

CONTENTS